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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/786,499	03/02/2001	Michael Hobson	GJE-0004	1435

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EXAMINER	
THOMPSON, JAMES A	

ART UNIT	PAPER NUMBER
2624	

DATE MAILED: 10/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/786,499	HOBSON ET AL.	
	Examiner	Art Unit	
	James A Thompson	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-16 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-16 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Oath/Declaration

2. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because there is no oath or declaration present in the file.

Specification

3. The disclosure is objected to because of the following informalities:

There are several formatting errors, such as the equation on page 12, line 30. Further problems include the formatting of equations or Greek symbols used in equations that are placed in line with the text, such as "$N_s \sim 10^6$" on page 7, line 13 and various instances of the symbol "ε" which are nearly illegible, such as on page 6, line 2, among others. Applicant should carefully review and format the specification and so that the specification is more legible and readable and correct any problems with equations and other elements of the specification. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-2, 4-5 and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Puetter (US Patent 5,912,993) in view of Ulich (US Patent 5,457,639).

Regarding claim 1: Puetter discloses a method of reconstructing a signal from a given set of data (column 3, line 67 to column 4, line 4 of Puetter), with a prediction function (column 7, equation 14 of Puetter) representing a predictable effect on the signal (column 7, lines 8-13 of Puetter), and a noise function (column 8, equation 19 of Puetter) representing unpredictable noise (column 8, lines 10-13 of Puetter), the method comprising the steps of altering the coordinate basis of the data and signal from an original coordinate basis (column 7, lines 9-11 of Puetter) in order to produce a prediction function having a reduced set of variables (column 7, lines 10-13 of Puetter). Correlating the pixel values in the pseudo-image (column 7, lines 9-11 of Puetter) and thus reducing the number of degrees of freedom (column 7, lines 10-13 of Puetter) inherently produces a reduced set of variables since the number of uncorrelated variables in a computational problem is equal to the number of degrees of freedom in said computational problem. Changing the number of degrees of freedom inherently

changes the coordinate basis since said coordinate basis uses a reduced set of variables, and thus a reduced set of coordinates.

Puetter further discloses performing a Bayesian reconstruction (column 3, line 67 to column 4, line 4 of Puetter) capable of operation of positive signal values to produce a reconstruction signal (column 6, lines 64-67 and column 7, equation 14 of Puetter).

Puetter further discloses converting the reconstruction signal back into the original coordinate basis to generate a signal (figure 5a and column 4, lines 16-21 of Puetter). The resultant image is used to update and improve the prior image (column 4, lines 16-21 of Puetter) and therefore must inherently be converted back into the original coordinate basis. This is further demonstrated in figure 5a of Puetter, which is the reconstructed image (column 3, lines 56-58 of Puetter) of the original image (figure 2 and column 3, lines 47-48 of Puetter) represented by the input data (figure 3a and column 3, lines 49-50 of Puetter).

Puetter does not disclose expressly that said Bayesian reconstruction is capable of operation of negative and complex signal values.

Ulich discloses a Bayesian reconstruction (column 7, line 65 to column 8, line 4 of Ulich) that is capable of operation of negative and complex signal values (column 9, lines 48-49 and lines 56-60 of Ulich). The signal values (Y_{uvx}) that are used in the calculations of the Bayesian reconstruction are given in terms of complex, frequency dependent (both spatial (u,v) and temporal (x)) values (column 9, lines 48-49 and lines 56-60 of Ulich). Therefore, said Bayesian reconstruction is capable of operation of complex signal values. Said Bayesian reconstruction is further capable of operation of

negative signal values since a negative value is simply a special case of a complex signal value, namely when the phase of said complex number is π radians.

Puetter and Ulich are combinable because they are from the same field of endeavor, namely Bayesian reconstruction of images. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to compute the Bayesian reconstruction of negative and complex signal values. The motivation for doing so would have been to be able to compute a reconstruction of an image in real time with a high spatial resolution (column 3, lines 18-24 of Ulich) based on the signal data received and processed in terms of the temporal and spatial frequency spectrum of said signal data, given by a Fourier transform of said signal data (column 9, lines 48-49 and lines 56-60 of Ulich). Therefore, it would have been obvious to combine Ulich with Puetter to obtain the invention as specified in claim 1.

Regarding claim 2: Puetter does not disclose expressly that the Bayesian reconstruction is performed using a Fourier basis.

Ulich discloses that the Bayesian reconstruction is performed (column 7, line 65 to column 8, line 4 of Ulich) using a Fourier basis (column 9, lines 48-49 and lines 54-60 of Ulich).

Puetter and Ulich are combinable because they are from the same field of endeavor, namely Bayesian reconstruction of images. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to perform the Bayesian reconstruction using a Fourier basis, as taught by Ulich. The motivation for doing so would have been to be able to compute a reconstruction of an image in real time with a

high spatial resolution (column 3, lines 18-24 of Ulich) based on the signal data received and processed in terms of the temporal and spatial frequency spectrum of said signal data, given by a Fourier transform of said signal data (column 9, lines 48-49 and lines 56-60 of Ulich). Therefore, it would have been obvious to combine Ulich with Puetter to obtain the invention as specified in claim 2.

Regarding claim 4: Puetter discloses that the Bayesian reconstruction employs the maximum entropy method (column 6, lines 29-33 of Puetter).

Regarding claims 5 and 7: Puetter discloses employing an evaluation parameter (δ) (column 7, equation 14 and lines 61-64 of Puetter) which is used to determine the signal-to-noise ratio (SNR) and therefore is determined during the reconstruction step (column 7, lines 61-64 and column 8, lines 12-14 of Puetter). Since the value of δ is used to determine the SNR of the image data (column 7, lines 61-64 of Puetter), then δ is an evaluation parameter. Since δ is determined during the reconstruction step, it is inherent that δ is determined from a prior reconstruction. The only image data available to determine δ and the SNR is image data from a prior reconstruction since δ and the SNR are used in determining the next iteration of image reconstruction. Further, whether said evaluation parameter is denoted as δ or α is merely a matter of notation and does not change any substantive aspect of the teachings of Puetter.

Regarding claim 8: Puetter discloses that the signal to be reconstructed is an image signal (column 6, lines 65-67; column 7, equation 14 and lines 8-9 of Puetter).

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Puetter (US Patent 5,912,993) in view of Ulich (US Patent 5,457,639) and Clarke (US Patent 5,576,548).

Regarding claim 3: Puetter in view of Ulich discloses that the Bayesian reconstruction is performed using a Fourier basis, as discussed in the arguments regarding claim 2 on pages 5-6 of the present office action, the arguments of which are incorporated herein.

Puetter in view of Ulich does not disclose expressly that the Bayesian reconstruction is performed using a wavelet basis.

Clarke discloses reconstructing an image using a wavelet basis (column 4, lines 15-21 of Clarke).

Puetter in view of Ulich is combinable with Clarke because they are from the same field of endeavor, namely image reconstruction and noise elimination. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a wavelet basis, as taught by Clarke, instead of the Fourier basis taught by Ulich. The motivation for doing so would have been that a wavelet basis can differentiate the image signal from the noise based on the frequency components (column 4, lines 18-21 of Clarke). Therefore, it would have been obvious to combine Clarke with Puetter in view of Ulich to obtain the invention as specified in claim 3.

7. Claims 6, 10-12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Puetter (US Patent 5,912,993) in view of Ulich (US Patent 5,457,639) and Hofstein (US Patent 4,099,179).

Regarding claim 6: Puetter discloses employing an evaluation parameter (δ) (column 7, equation 14 and lines 61-64 of Puetter) which is used to determine the local size of the pixon (column 7, lines 61-64 of Puetter). Further, whether said evaluation parameter is denoted as δ or α is merely a matter of notation and does not change any substantive aspect of the teachings of Puetter.

Puetter in view of Ulich does not disclose expressly that said evaluation parameter is set at a fixed value.

Hofstein discloses processing images for a television screen (figure 1(30); and column 6, lines 9-13 and lines 48-50 of Hofstein), which is well-known in the art to have a rectangular grid of evenly-sized and evenly-spaced pixels.

Puetter in view of Ulich is combinable with Hofstein because they are from the same field of endeavor, namely image data processing and display. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use pixels that are of constant, even size and evenly spaced in a rectangular grid, as taught by Hofstein. The use of such pixels would result in the evaluation parameter (δ) being set at a fixed value since said evaluation parameter is a measure of the local pixon size (column 7, lines 61-64 of Puetter). The motivation for doing so would have been to be able to use a standard raster scan and display for the image data (column 6, lines 48-50

of Clarke). Therefore, it would have been obvious to combine Hofstein with Puetter in view of Ulich to obtain the invention as specified in claim 6.

Regarding claim 10: Puetter in view of Ulich does not disclose expressly that the signal to be reconstructed is a radar signal.

Hofstein discloses reconstructing a radar signal (column 6, lines 59-68 of Hofstein).

Puetter in view of Ulich is combinable with Hofstein because they are from the same field of endeavor, namely image data processing and display. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use radar signals as the input signal for image reconstruction, as taught by Hofstein. The motivation for doing so would have been to determine the position of targets (column 7, lines 1-5 of Hofstein). Therefore, it would have been obvious to combine Hofstein with Puetter in view of Ulich to obtain the invention as specified in claim 10.

Regarding claims 11-12: Puetter in view of Ulich does not disclose expressly that the signal to be reconstructed is an acoustic data signal.

Hofstein discloses reconstructing an acoustic data signal (column 7, lines 22-30 of Hofstein), wherein said acoustic data signal is an underwater sonar signal (column 7, lines 9-15 of Hofstein).

Puetter in view of Ulich is combinable with Hofstein because they are from the same field of endeavor, namely image data processing and display. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use sonar signals as the input signal for image reconstruction, as taught by Hofstein. The

motivation for doing so would have been to obtain information regarding objects and events below the surface of the water (column 7, lines 9-12 of Hofstein). Therefore, it would have been obvious to combine Hofstein with Puetter in view of Ulich to obtain the invention as specified in claims 11-12.

Regarding claim 15: Puetter in view of Ulich does not disclose expressly that the signal is a communication signal.

Hofstein discloses processing a radio signal (column 6, lines 65-68 of Hofstein), which is a form of communication signal.

Puetter in view of Ulich is combinable with Hofstein because they are from the same field of endeavor, namely image data processing and display. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a communication signal as the signal to process, as taught by Hofstein. The motivation for doing so would have been to scan target objects based on the return echoes of said communication signals (column 6, lines 63-65 of Hofstein). Therefore, it would have been obvious to combine Hofstein with Puetter in view of Ulich to obtain the invention as specified in claim 15.

8. Claims 13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Puetter (US Patent 5,912,993) in view of Ulich (US Patent 5,457,639), Hofstein (US Patent 4,099,179), and Bahorich (US Patent 5,226,019).

Regarding claim 13: Puetter in view of Ulich and Hofstein does not disclose expressly that the acoustic data signal is a geophysical data signal.

Bahorich discloses processing geophysical data signals (column 3, lines 60-61 and column 4, lines 6-10 of Bahorich).

Puetter in view of Ulich and Hofstein is combinable with Bahorich because they are from the same field of endeavor, namely image data processing and display. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically acquire and process geophysical data, as taught by Bahorich. The motivation for doing so would have been to obtain information about the Earth's structure, lithology, geology, and pore fluid content (column 2, lines 53-57 of Bahorich). Therefore, it would have been obvious to combine Bahorich with Puetter in view of Ulich and Hofstein to obtain the invention as specified in claim 13.

Regarding claim 16: Puetter in view of Ulich and Hofstein does not disclose expressly that the communication signal is a time-series signal.

Bahorich discloses processing a time-series signal (column 2, lines 53-57 of Bahorich).

Puetter in view of Ulich and Hofstein is combinable with Bahorich because they are from the same field of endeavor, namely image data processing and display. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically use a time-series signal, as taught by Bahorich. The motivation for doing so would have been that time-series signals are useful for extracting a variety of information (column 2, lines 53-57 of Bahorich). Therefore, it would have been obvious to combine Bahorich with Puetter in view of Ulich and Hofstein to obtain the invention as specified in claim 16.

9. Claims 9 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Puetter (US Patent 5,912,993) in view of Ulich (US Patent 5,457,639) and Larson (US Patent 5,252,922).

Regarding claim 9: Puetter in view of Ulich does not disclose expressly that the image signal is a medical image signal.

Larson discloses processing medical image signals (column 10, lines 28-31 of Larson).

Puetter in view of Ulich is combinable with Larson because they are from the same field of endeavor, namely image data processing and display. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically process medical image data, as taught by Larson. The motivation for doing so would have been to obtain information about a living beings organs and tissues (column 10, lines 28-31 of Larson). Therefore, it would have been obvious to combine Larson with Puetter in view of Ulich to obtain the invention as specified in claim 9.

Regarding claim 14: Puetter in view of Ulich does not disclose expressly that the signal to be reconstructed is a signal from spectroscopy.

Larson discloses reconstructing images from spectroscopy (column 4, lines 25-31 of Larson).

Puetter in view of Ulich is combinable with Larson because they are from the same field of endeavor, namely image data processing and display. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically use spectroscopic imaging, as taught by Larson. The motivation for doing

so would have been that spectroscopy can provide spatially resolved discrimination of medical tissue images (column 4, lines 30-35 of Larson). Therefore, it would have been obvious to combine Larson with Puetter in view of Ulich to obtain the invention as specified in claim 14.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A Thompson whose telephone number is 703-305-6329. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K Moore can be reached on 703-308-7452. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James A. Thompson
Examiner
Art Unit 2624

JAT
23 September 2004

THOMAS D. LEE
PRIMARY EXAMINER